इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 14696 (2000): Transmission Steel Roller Chains and Chain Wheels for Oil Field Applications [PGD 31: Bolts, Nuts and Fasteners Accessories]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS 14696 : 2000

(Reaffirmed 2005)

भारतीय मानक

तेल-क्षेत्र के अनुप्रयोगों के लिए संचरण इस्पात रोलर चेन और चेन व्हील – विशिष्टि

Indian Standard

TRANSMISSION STEEL ROLLER CHAINS AND CHAIN WHEELS FOR OIL FIELD APPLICATIONS — SPECIFICATION

ICS 77.140.65; 75.180.01

© BIS 2000

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 2000

Price Group 9

Transmission Devices Sectional Committee, LM 10

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Transmission Devices Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

Oil field chain and chain wheels are used in oil field drilling and producing operations. The Indian industry particularly Oil & Natural Gas Commission has been using these types of chain. Therefore, the need was felt to formulate an Indian Standard on the subject. This standard aims at setting parameters which are internationally accepted.

While formulating this standard, considerable assistance has been derived from the following:

a) API Spec 7F, 1990 'Specification for oil field chain and sprockets' issued by the American Petroleum Institute (API), and

b) ASME/ANSI B29.1M-1986 'Precision power transmission roller chains, attachments and sprockets' issued by the American Society of Mechanical Engineers.

The Supplementary Information also contains suggestions concerning the application and use of the chains covered by this Indian Standard (*see* Annex A).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TRANSMISSION STEEL ROLLER CHAINS AND CHAIN WHEELS FOR OIL FIELD APPLICATIONS — SPECIFICATION

1 SCOPE

This standard covers the dimensions and other requirements of standard series and heavy series roller chains and sprockets, used for oil field and allied applications.

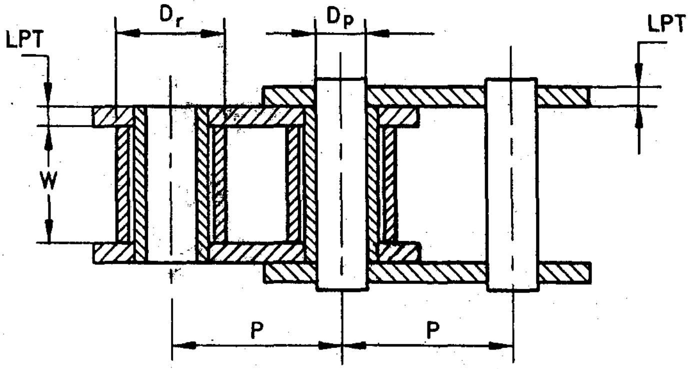
NOTE — Heavy series chains are made in 19.05 mm and larger and differ from standard series chains in thicknesses of link plates. Their value is only in the acceptance of higher loads during low speed operation.

2 DIMENSIONS AND TOLERANCES OF CHAINS

2.1 Dimensions

Standard and heavy series chains shall conform to the dimensions given in Table 1. They represent limits for interchangeability but are not the actual tolerances that should be used for manufacture.

Table 1 Dimensions of Standard Series and Heavy Series Chain



P – Chain pitch
D_r – Roller diameter
LPT – Link plate thickness
W – Chain width between roller link plates
D_p – Pin diameter

Standard Chain No.	Pitch (*P*)	Maximum Roller Dia (D_r)	Chain Width (*Min*) *W*	Pin Dia (*Max*) D_P	Link Plate Thickness (*LPT*)		Measuring Load N	Length Tolerance
					Standard Series	Heavy Series		
	mm	mm	mm	mm	mm	mm		mm/m
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
40	12.70	7.92	7.92	3.96	1.52	—	137.9	1.58
50	15.88	10.16	9.52	5.08	2.03	—	218.0	1.50
60	19.05	11.91	12.70	5.94	2.39	3.18	311.4	1.42
80	25.40	15.87	15.88	7.92	3.18	3.96	556.0	1.33
100	31.75	19.05	19.05	9.52	3.96	4.75	867.4	1.33
120	38.10	22.22	25.40	11.10	4.75	5.56	1 250.0	1.25
140	44.45	25.40	25.40	12.70	5.56	6.35	1 704.0	1.25
160	50.80	28.57	31.75	14.27	6.35	7.14	2 224.0	1.25
180	57.15	35.71	35.71	17.45	7.14	7.92	2 816.0	1.25
200	63.50	39.67	38.10	19.84	7.92	9.52	3 474.0	1.25
240	76.20	47.62	47.62	23.80	9.52	12.70	5 004.0	1.25

NOTE — '*H*' is added after chain number to deonte heavy series chain. *See also* **8.**

2.2 Chain Length Measurement and Tolerances

2.2.1 The length shall be measured at a measuring load which correspond to 1 percent of the minimum ultimate tensile strength subject to minimum of 80 N and a maximum of 4 460 N for both single as well as for multiple strand chain.

2.2.2 Length measurements shall be taken over a length of at least 300 mm.

2.2.3 New chains, under standard measuring load, shall not be underlength.

2.2.4 The tolerance on length shall be within the values given in Table 1.

3 MINIMUM ULTIMATE TENSILE STRENGTH

3.1 Minimum ultimate tensile strength is the minimum load at which an unused, undamaged chain may be expected to fail when subjected to a single tensile load cycle (*see* Table 2). Minimum ultimate tensile strength is not a measure of the load at which a chain may be applied. It is indicative only of the tensile strength quality of the chain.

3.2 Any chain tests made to verify the ultimate tensile strength shall be considered destructive. Consequently, all chain specimen subjected to such tests, failed, or otherwise, shall be deemed unfit for application purposes.

3.3 The minimum ultimate tensile strength of standard and heavy series chain shall be as specified in Table 2.

Table 2 Standard Series and Heavy Series Chain Capacities

Standard Chain No.	Ultimate Tensile Strength (*Min*) N	Press-Out Force (*Min*) N		Dynamic Test Load	
		Pin	Bush	*Max* N	*Min* N
(1)	(2)	(3)	(4)	(5)	(6)
40	13 900	800	480	3 069	307
50	21 710	1 334	801	4 804	480
60	31 270	1 833	1 099	6 895	690
80	55 600	3 238	1 944	12 055	1 206
100	86 870	4 715	2 825	18 460	1 846
120	125 100	6 361	3 821	25 978	2 598
140	170 270	8 363	4 982	34 340	3 434
160	222 400	10 542	6 316	43 771	4 377
180	281 470	15 747	9 430	53 823	5 382
200	347 500	20 373	12 188	64 499	6 450
240	529 400	23 931	15 747	86 296	8 630

3.4 The values given in Table 2 are applicable for single strand chain. For multiple strand chain, the values equals that of the single strand multiplied by the number of strands.

4 PROOF TESTING

All chains shall be proof tested during manufacture by applying a tensile strength equivalent to one-third of minimum tensile strength.

5 MINIMUM PRESS-OUT FORCE

5.1 Press-out force is the force required to move a single pin, or bushing, in a single link plate. This value provides pin and bush retention characteristics. This is indicative of the aperture condition in the link plates and the interference fits of the pins and bushings in their respective link plates.

5.1.1 *Pin and Pin Link Plates*

Chain link assemblies that are assembled with riveted pin heads shall have the rivet removed, exercising care not to remove the link plate metal below the surface of the link plate. One of the link plates shall be removed carefully to avoid destroying the joint integrity between the pins and the link plates. The remaining plate shall be placed in a hydraulically or mechanically operated testing machine with the pin link level and supported to prevent movement when pressure is applied. A single axial load shall be slowly applied to the pin, pressing the pin out of the joint towards the inside of the plate. The minimum press-out force shall be as specified in Table 2.

5.1.2 *Roller Link Plate*

One of the roller link plates shall be removed using the same method as described for the pin link. Remove the two rollers from the bushings and place the plate with the two bushings in the testing machine with the plate supported to prevent movement when pressure is applied. A single axial load shall be slowly applied to the end of the bushing, pressing the bushing out of the plate. The minimum press-out force shall be as specified in Table 2.

6 MINIMUM DYNAMIC STRENGTH

6.1 Standard series single strand chain, when tested according to procedure given in **6.2** shall be capable of withstanding minimum 3 millions cycles at the dynamic test loads given in Table 2 without a failure.

NOTES

1 The dynamic test values are not valid characteristics for the designing of actual applications. Neither the specified values nor the test results are to be interpreted as allowable working loads.

2 The dynamic test is a destructive test. Even though the chain may survive the test without failure, it will be deemed as damaged and will be unfit for service.

3 This test shall be carried out whenever required as per contractual obligations between the manufacturer and the purchaser.

6.2 Test Procedure

6.2.1 An unused, undamaged, length of chain, containing at least five free pitches, shall be mounted in the test machine by means of fixtures which permit free movement on both sides of the chain centerline in the normal plane of articulation. Any links which are enclosed by or are in contact with the fixtures, shall be excluded from the count of free pitches.

6.2.2 An axial force shall be applied, varying, sinusoidally between the maximum and minimum loads given in Table 2 for a period of 3 million cycles. Fracture of any component in less than 3 million cycles shall constitute failure of this test.

6.2.3 Failures in the links that are in contact with the fixtures (not one of the free pitches) shall be disregarded, and an additional sample shall be tested.

7 GENERAL REQUIREMENTS

7.1 Riveted pin type chains shall be preferred against cotter type pin chains for oil field applications.

7.2 Connecting links shall use interference fit link plates because their capacity is virtually same as the rest of the chain. The use of slip fit links plates shall be avoided because the capacity can be much less than rest of the chain.

7.3 Use of off-set links may be avoided wherever possible because their capacity is much less than the rest of the chain. If the off-set link is necessary a double off-set link shall be used.

8 CHAIN DESIGNATION

Chain covered by this specification shall be designated by chain number, standard/heavy series chain and number of strands. For example, chain number 160 heavy series of six strands shall be designated as:

Chain IS 14696 160 H-6

Number of strands
(Not stamped on plates)

Heavy series (Omit on
standard chain)

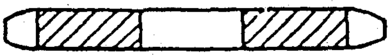
Chain number :
(*See* Table 1)

9 SPROCKETS FOR ROLLER CHAIN

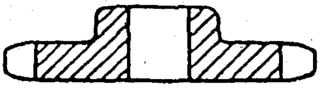
9.1 Sprocket Types

Four types of sprockets covered by this specification are shown in Fig. 1 and are designated as:

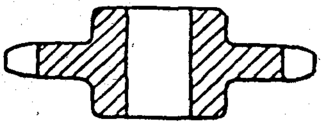
Type A – Plain plate
Type B – Hub on one side only
Type C – Hub on both sides
Type D – Hub detachable



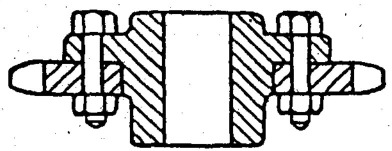
TYPE A PLAIN PLATE



TYPE B HUB ON ONE SIDE ONLY



TYPE C HUB ON BOTH SIDES



TYPE D HUB DETACHABLE

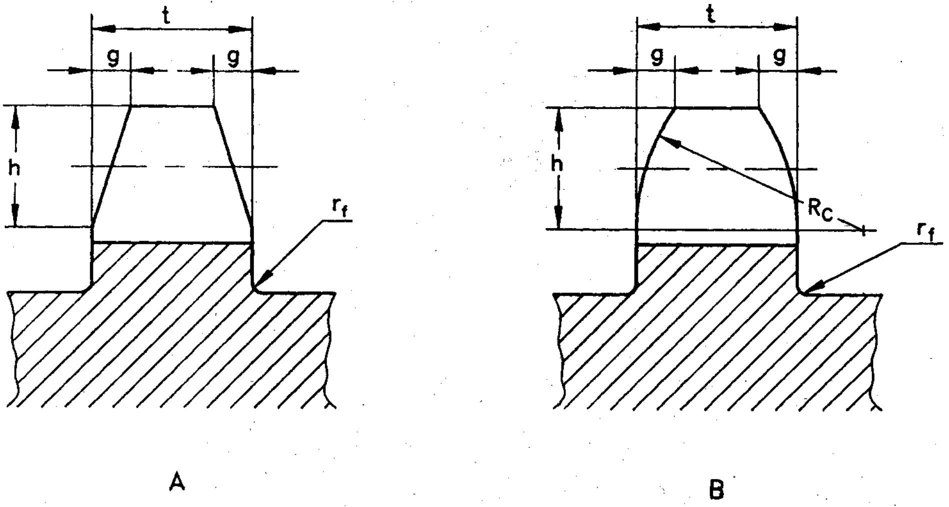
FIG. 1 TYPES OF SPROCKET

9.2 Tooth Profile

Sections A and B, in Fig. 2 show the recommended sprocket tooth chamfer for roller chains. All sprocket flanges shall be chamfered to guide the chain onto the sprocket in case of misalignment due to sprocket misalignment or permissible flange weave. Flange chamfer shall be either as per Section A or B or any intermediate profile.

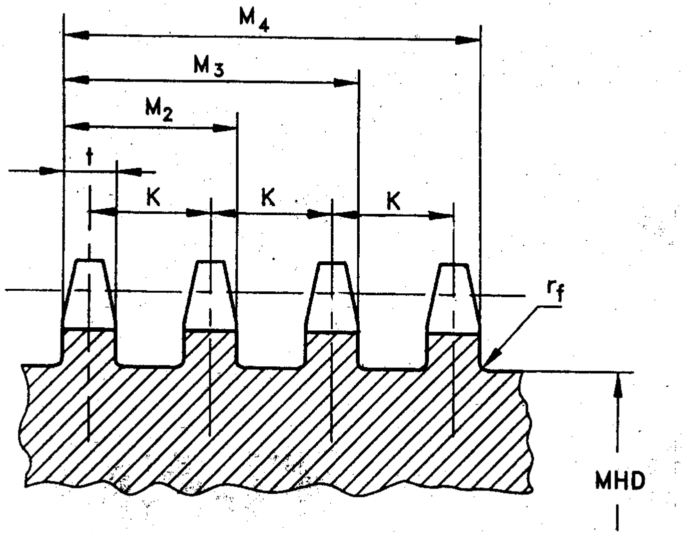
The fillet radius r_f *Max* is 0.04 times the pitch for maximum hub diameter. Other dimensions indicated in Fig. 2 shall be as given in Table 3.

9.3 Flange thickness and location dimensions are shown in Fig. 3.



h = Approximately $0.5P$ = depth of chamfer
g = Approximately $1/8P$ (but not to exceed $W/3$)
R_c = $1.063P$ (approximately tangent to side) = chamfer radius
r_f *Max* = $0.04P$ for maximum hub diameter = fillet radius
t = Thickness

FIG. 2 FLANGE TOOTH SECTION PROFILE



P = Chain pitch (*see* Table 3)
W = Nominal chain width
LPT = Nominal thickness of link plates
MHD = Maximum hub and groove diameter
r_f *Max* = $0.04P$ for maximum hub diameter = fillet radius
t_1 = Maximum thickness for single strand chain
= $0.93W - 0.15$
t_2 = Maximum thickness for double and triple strand chain
= $0.90W - 0.15$
t_4 = Maximum thickness for quadruple strand chain and over
= $0.86\,W - 0.30$
K = Transverse pitch for multiple strand chain
= $W + 4.22 \times LPT$
M_2, M_3, M_4, etc = K (Strand multiple − 1) + t

where t is flange thickness.

FIG. 3 SPROCKET TOOTH FLANGE LOCATION (SECTION C)

Table 3 Sprocket Tooth Section Profile Dimensions of Sprockets

(*Clause* 9.2)

All dimensions in millimetres.

Chain No.	Chain Pitch P	Depth of Chamfer, h	Width of Chamfer, g	Radius, R_c	Transverse Pitch, K	
					Standard Series	Heavy Series
(1)	(2)	(3)	(4)	(5)	(6)	(7)
40	12.70	6.35	1.57	13.49	14.38	—
50	15.88	7.92	1.98	16.87	18.11	—
60	19.05	9.52	2.39	20.22	22.78	26.11
80	25.40	12.70	3.18	26.97	29.29	32.59
100	31.75	15.88	3.96	33.71	35.76	39.09
120	38.10	19.05	4.78	40.46	45.44	48.87
140	44.45	22.22	5.56	47.19	48.87	52.20
160	50.80	25.40	6.35	53.95	58.55	61.90
180	57.15	28.58	7.14	60.76	65.84	69.16
200	63.50	31.75	7.92	67.41	71.55	78.31
240	76.20	38.10	9.52	80.95	87.83	101.22

NOTE — The sprocket dimensions (R_c, g and h) are non-critical and are given only as a guide for general design proportions.

10 MARKING

10.1 The chain shall be marked with the designation (*see* **8**) and the manufacturer's identification mark at least once in every 300 mm length.

10.2 BIS Certification Marking

The chain may also be marked with the Standard Mark.

10.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Foreword*)

SUPPLEMENTARY INFORMATION

A-1 CHAIN SELECTION

A-1.1 Design Factors

A-1.1.1 *General*

The horsepower ratings in Tables 10 to 20 generally apply to lubricated single pitch, single strand roller chains, both standard and heavy series. For horsepower ratings of multiple strand chains, refer to Table 4. The horsepower ratings reflect a service factor of 1, a chain length of approximately 100 pitches, the use of interference-fit connecting links and interference-fit off-set sections, use of recommended lubrication methods, and a drive arrangement where two aligned sprockets are mounted on parallel shafts in a horizontal plane. Under these conditions, approximately 15 000 h of service life at full load operation may generally be expected. Substantial increases in rated speed loads may be utilized, as and when a service life of less than 15 000 h is satisfactory, or when full load operation is encountered only during a portion of the required service life.

It is beyond the scope of this standard to present selection procedures for all conditions. The chain manufacturers may be consulted for assistance with any special application requirements.

Table 4 Multiple Strand Factors

(*Clauses* A-1.1.1 *and* A-1.3)

Number of Strands	Multiple Strand Factor
(1)	(2)
2	1.7
3	2.5
4	3.5

A-1.1.2 *Drive Selection*

The horsepower ratings related to the speed of the smaller sprocket and drive selections are made on this basis, whether the drive is speed reducing or speed increasing.

Drives with more than two sprockets, idlers, composite duty cycles, or other unusual conditions often require special consideration. It is advisable to consult chain manufacturers for selections of this nature.

Where quietness or extra smooth operation are of special importance, a small pitch chain operating over large diameter sprockets shall minimize noise and vibration.

When making drive selections, consideration is given to the loads imposed on the chain by the type of input power and the type of equipment to be driven. Service factors are used to compensate for these loads, and the required horsepower rating of the chain is determined by the following equation:

$$\text{Required } hp = \frac{hp \text{ to be transmitted} \times \text{Service factor}}{\text{Multiple strand factor}}$$

A-1.2 Service Factors

The service factors in Table 5 are for normal chain loading. For unusual or extremely severe operating conditions not shown in this table, it is desirable to use larger service factors.

Table 5 Service Factors

Type of Driven Load	Type of Input Power		
	Internal Combustion Engine with Hydraulic Drive	Electric Motor or Turbine	Internal Combustion Engine with Mechanical Drive
(1)	(2)	(3)	(4)
Smooth	1.0	1.0	1.2
Moderate shock	1.2	1.3	1.4
Heavy shock	1.4	1.5	1.7

A-1.3 Multiple Strand Factors

Horsepower ratings for single strand chains are shown in Tables 10 to 20. The horsepower ratings for multiple strand chains equal single strand ratings multiplied by the factors given in Table 4.

A-2 LUBRICATION

A-2.1 Lubrication Flow

Each joint in a roller chain is a journal bearing, so it is essential that it receives an adequate amount of the proper lubricant to achieve maximum wear life. In addition to resisting wear between the pins and bushings, an adequate flow of lubricant smooths the engagement of the chain rollers with the sprockets, cushions roller to sprocket impacts, dissipates heat, flushes away wear debris and foreign materials, and retards rust.

The lubricant shall be applied to the upper edges of the link plates in the lower span of the chain shortly before the chain engages a sprocket (*see* Fig. 4 and 5). Then, gravity and centrifugal force shall aid in carrying the lubricant to the critical pin and bushing surfaces. Surplus lubricant spilling over the link plate edges shall supply the roller and bushing surface.

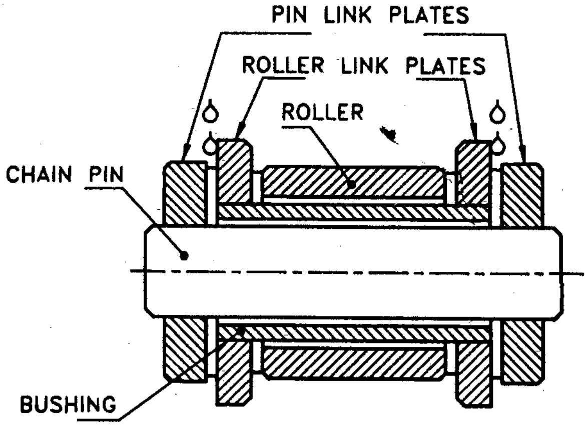


FIG. 4 LUBRICANT FLOW INTO CHAIN JOINT

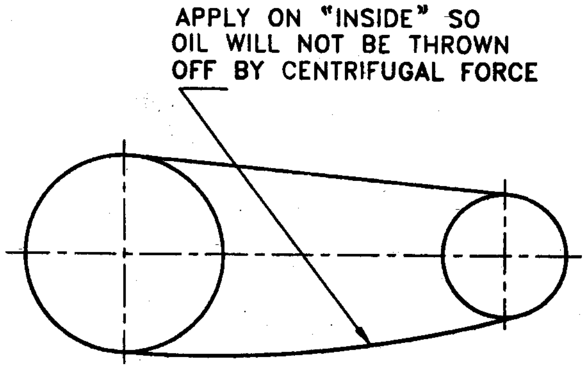

APPLY ON "INSIDE" SO OIL WILL NOT BE THROWN OFF BY CENTRIFUGAL FORCE

FIG. 5 APPLICATION OF LUBRICANT TO CHAIN

A-2.2 Lubricant Characteristics

Lubricants for roller chain drive shall have the following characteristics:

a) Sufficiently low viscosity to penetrate into the critical internal surfaces.

b) Sufficiently high viscosity, or appropriate additives, top maintain the lubricating film under the prevailing bearing pressures.

c) Clean and free of corrodents.
d) Capability to maintain lubrication qualities under the prevailing operating conditions.
e) These requirements usually are met by a goods grade non-detergent petroleum base oil. Detergents normally, are not necessary, but anti-foam, anti-rust, and film strength improving additives often are beneficial.
f) Low grade or impure oils shall be avoided. Low grade oils may not provide effective lubrication and acids or abrasive particles in the oil may damage the chain beyond repair. Heavy oils or greases shall not be used because they are too thick to penetrate into the internal surfaces of the chain. The recommended grades of oil for various surrounding temperature ranges are shown in Table 6.

Table 6 Recommended Grades of Oil for Various Temperature Ranges

Recommended Grade (1)	Temperature Range (°C) (2)
SAE 5	– 46 to +10
SAE 10	– 29 to +27
SAE 20	– 12 to +43
SAE 30	– 7 to +54
SAE 40	– 1 to +60
SAE 50	+ 4 to +66

NOTE — When the temperature range permits a choice, the heavier grade shall be used.

A-2.3 Type of Lubrication

The type of lubrication is mainly influenced by the chain speed which shall be selected from Table 7. The recommended type shall be regarded as minimum lubrication requirements and the use of a better type may be beneficial.

Table 7 Type of Lubrication for Chain Size and Speed

(*Clause* A-2.3)

Chain Pitch mm	Chain Speed, m/min		
	Type 1	Type 2	Type 3
(1)	(2)	(3)	(4)
12.70	Up to 88	Up to 670	Over 670
15.88	73	588	588
19.05	64	530	530
25.40	52	451	451
31.75	44	396	396
38.10	38	357	357
44.45	34	329	329
50.80	30	305	305
57.15	27	283	283
63.50	26	268	268
76.20	23	241	241

A-2.3.1 *Type 1 Lubrication (Manual or Drip Lubrication)*

A-2.3.1.1 *Manual lubrication*

For manual lubrication, oil is applied periodically with a brush or a spout can preferably once for every 8 h of operation. The time may be longer than 8 h, if it has proven adequate for that particular drive. The volume and frequency of oil application shall be sufficient to prevent overheating of the chain or red-brown(rust) discolouration of the oil in the joints. The red-brown discolouration indicates that the oil in the joints is inadequate. When the rust discolouration is found; remove, clean, relubricate and re-install the chain before continuing operation.

NOTE — Manual lubrication is to be done only when the drive is stopped and power to the drive is locked out.

A-2.3.1.2 *Drip lubrication*

Oil is dripped between the link plate edges from a drip lubricator. Drip rates range from 4 to 20 or more drops per minute, depending on chain speed. Here again the drip rate shall be sufficient to prevent a red-brown (rust) discolouration of the lubricant in the chain joints. Care shall be taken to prevent windage from mis-directing the oil drops. The oil level in the reservoir shall be checked after every 8 h of operation and the reservoir refilled when needed.

For multiple strand chains, a distribution pipe is needed to feed oil to all the rows of link plates and a wick packing, usually, is required to distribute oil uniformly to all holes in the pipe as shown in Fig. 6.

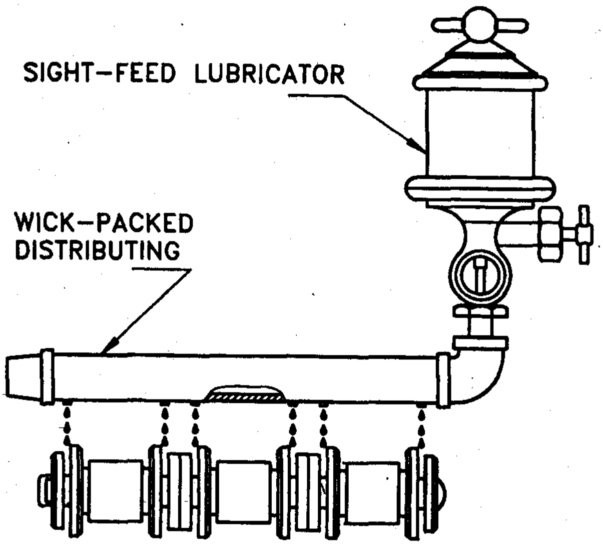


FIG. 6 DRIP FEED LUBRICATION

A-2.3.2 *Type* 2 *Lubrication* (*Oil Bath or Slinger Disc Lubrication*)

A-2.3.2.1 *Oil bath lubrication*

A short section of the lower strand of the chain runs through sump of oil in the chain casing (*see* Fig. 7). The oil level shall just reach the pitch line of the chain at its lowest point in operation. Long sections of chain running through the oil bath, as in a nearly horizontal lower span, shall be avoided because they may cause oil foaming and over heating.

A-2.3.2.2 *Slinger disc lubrication*

The chain operates above the oil level. A disc on one shaft picks oil up from the sump and slings it against a collector plate. Then the oil usually flows into a trough which applies it to the upper edges of the link plates in the lower strand of the chain (*see* Fig. 8). The diameter of the disc shall produce rim speeds between 183 m/min and 2 438 m/min. Lower speeds may not pick up the oil effectively, while higher speeds may cause oil foaming or overheating.

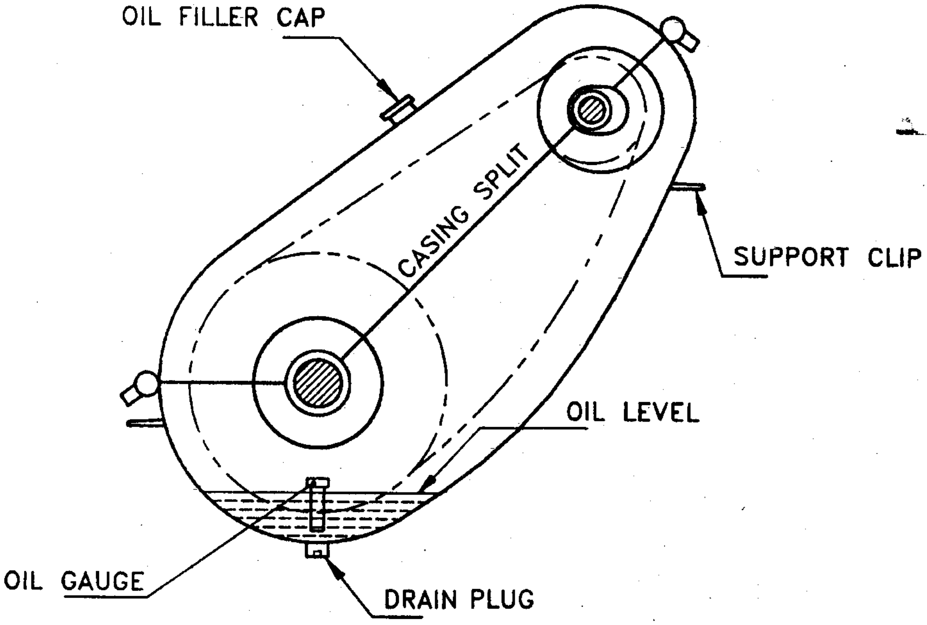


FIG. 7 OIL BATH LUBRICATION

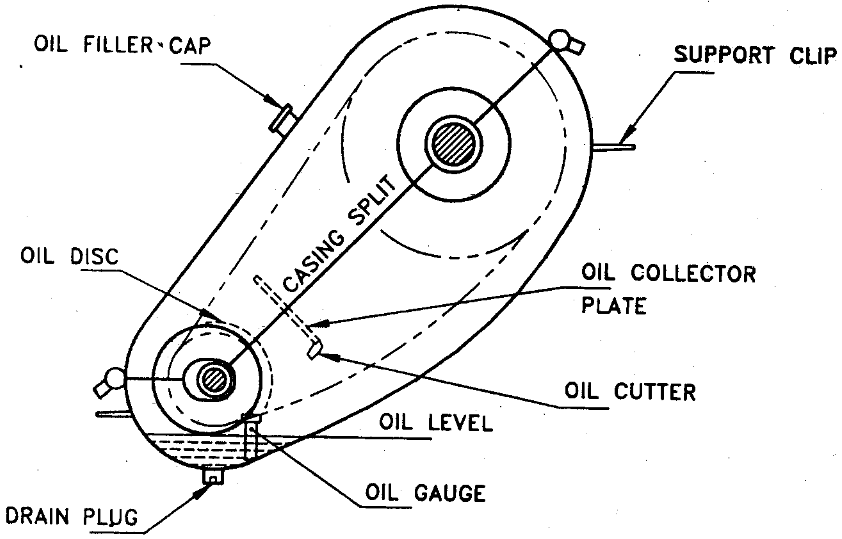


FIG. 8 SLINGER DISC LUBRICATION

A-2.3.2.3 In both oil bath and slinger disc lubrication, the temperature of the oil bath and the chain shall not exceed 82°C. Also, the volume of oil applied to the chain shall be great enough to prevent the red-brown (rust) discolouration of lubricant in the chain joints. The oil level in the sump of both oil bath and slinger disc systems shall be checked after every 8 h of operation, and oil added when needed. At the same time, the system shall be checked from leaking, foaming, or overheating.

A-2.3.3 *Type* 3 *Lubrication*

A-2.3.3.1 *Oil stream lubrication*

With oil stream lubrication, a pump delivers oil under pressure to nozzles that direct a stream or spray onto the chain. The oil shall be applied evenly across the width of the chain and be directed onto the lower span from inside the chain loop (*see* Fig. 9). Excess oil collects in the bottom of the casing and is returned to the pump suction reservoir. A pressure regulating valve may be used to divert excess pump discharge to the reservoir. Oil cooling may be by radiation from the external surfaces of the reservoir or by a separate heat exchanger.

A-2.3.3.2 Oil stream lubrication is always recommended for chains operating at relatively high speeds and loads. It is absolutely essential for roller chains that operate in the indicated galling region for any extended period of time. The oil stream not only wear debris from a drive being run at or near full rated capacity. The minimum oil flow rate for the amount of horsepower being transmitted is shown in Table 8.

Table 8 Required Oil Flow for Chain Drives

Transmitted *hp* (kW) (1)	Minimum Required *l/Min* (2)
37	0.95
75	1.89
112	2.84
149	3.78
224	5.68
298	7.57
373	9.46
447	11.4
597	14.2
746	18.0
1 119	26.5
1 491	37.9

A-3 MAINTENANCE

A-3.1 Inspection and Service Schedule

A roller chain drive requires proper and timely maintenance to deliver satisfactory performance and service life. It is assumed that the shafts, bearings and supports; the chain and sprockets; and the lubrication type have been properly selected and installed. Then, a maintenance programme shall be established to ensure that:

a) The drive is correctly lubricated.

b) Drive interferences are eliminated.

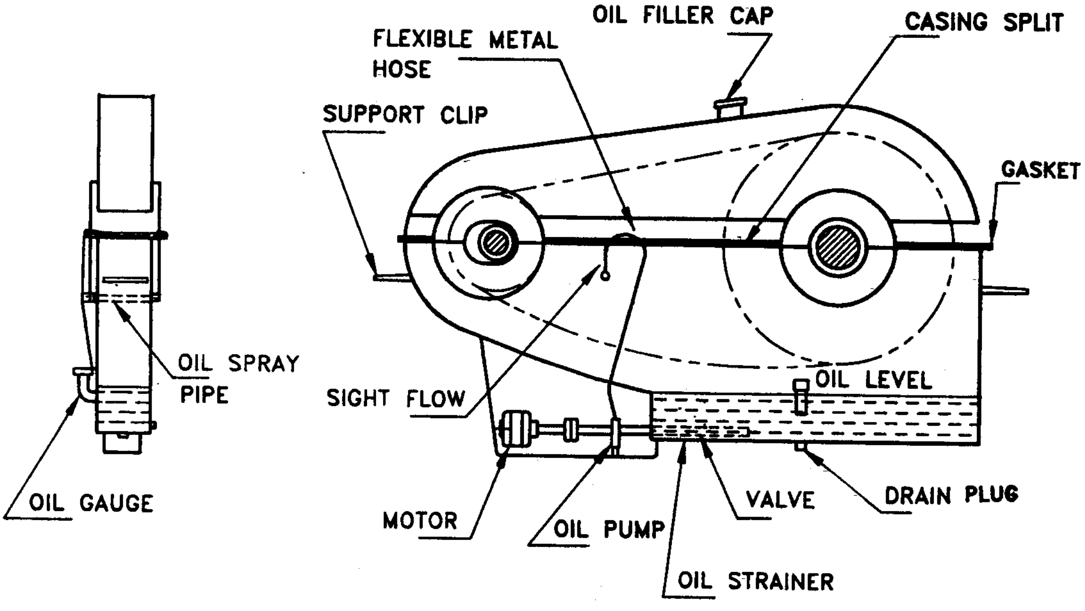


FIG. 9 OIL STREAM LUBRICATION

c) Damaged chains or sprockets are replaced.
d) Worn chains or sprockets are replaced.
e) The sprockets are properly aligned.
f) The chain is correctly tensioned.
g) Guarding is in good condition and is properly installed.

A-3.1.1 A roller chain drive shall be inspected after the first 50 h of operation. After that, drives subject to heavy shock loads or severe operating conditions shall be inspected after every 200 h of operation, while more ordinary drives may be inspected after every 500 h of operation. Experience may indicate a longer or shorter interval between inspections.

At each inspection, the items given in **A-3.2** to **A-3.5** should be checked and corrected when necessary.

A-3.2 Inspect Lubrication System

For manual lubrication, ensure that the lubrication schedule is being followed and the correct grade of oil is being used. If the chain is dirty, clean it with kerosene or a non-flammable solvent and re-lubricate it. For drip lubrication, check the flow rate and be sure that the oil is being directed onto the chain correctly. For oil bath, slinger disc, or oil stream lubrication, ensure that all orifices are clear and that the oil is being directed onto the chain correctly. Change the oil after the first 50 h of operation, and after every 500 h thereafter (200 h in severe service).

A-3.3 Inspect for Drive Interferences

Inspect for any evidence of interference between the drive components and other parts of the equipment. If found, correct it immediately. Rubbing between the chain or sprockets and other parts of the machine may cause abnormal wear and damage. Impact between the chain link plates and rigid object may cause link plate fatigue and chain failure. Also eliminate any build-up of debris or foreign material between the chain and sprockets. A relatively small amount of debris in the sprocket roller seat may cause tensile load great enough to break the chain if forced through the drive.

A-3.4 Inspect for Damaged Chain or Sprockets

Inspect the chain for cracked, broken, deformed, or corroded parts; and for tight joints or turned pins. If any are found, locate and eliminate the cause of the damage and REPLACE THE ENTIRE CHAIN. Even though the seal of the chain appears to be in good condition, very probably it has been damaged and more failures are likely to occur in a short time.

Inspect sprockets for chipped, broken, or deformed teeth. If any are found, locate and eliminate the cause of the damage and REPLACE THE SPROCKET. Sprockets normally are stronger and less sensitive to damage than chain but running a worn chain on new sprockets may ruin the sprocket in a short time. This is because a worn chain rides very high on the sprocket teeth and wears the sprocket teeth in an abnormal pattern.

A-3.5 Inspect for Chain Wear

In most roller chain drives, the chain is considered worn out when it has reached 3 percent wear elongation. With 3 percent wear, the chain does not engage the sprocket properly and may cause sprocket damage or chain breakage. On drives with large sprockets (more than 66 teeth), allowable wear is limited to 200/N (Here N = Number of teeth on largest sprocket) and may be substantially less than 3 percent. On fixed-center, non-adjustable drives, allowable wear elongation is limited to about one-half of one chain pitch.

Measure a representative section of chain, as shown in Fig. 10 and Table 9 and if wear elongation exceeds 3 percent or the functional limit, replace the entire chain. Do not connect a new section of chain to worn section because it may run rough and damage the drive.

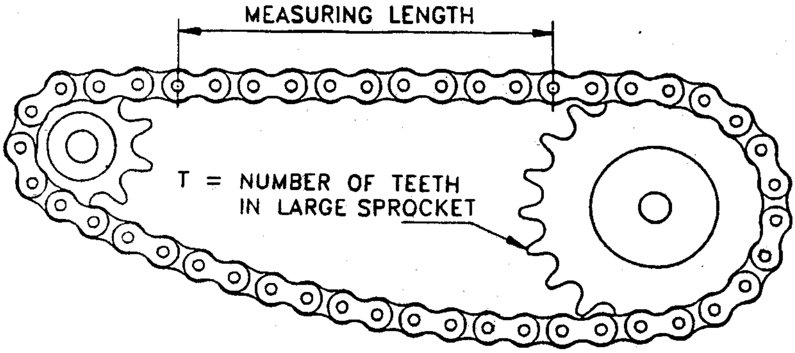


FIG. 10 MEASUREMENT OF CHAIN FOR WEAR ELONGATION

Table 9 Chain Wear Elongation Limits

(*Clause* A-3.5)

Chain Number	Chain Pitch mm	Measured Length		
		No. of Pitches	Nominal, mm	At 3 percent Wear, mm
(1)	(2)	(3)	(4)	(5)
25	6.35	48	305	314
35	9.52	32	305	314
41	12.70	24	305	314
40	12.70	24	305	314
50	15.88	20	318	327
60	19.05	16	305	314
80	25.40	12	305	314
100	31.75	20	635	654
120	38.10	16	610	628
140	44.45	14	622	641
160	50.80	12	610	628
180	57.15	12	686	706
200	63.50	10	635	654
240	76.20	8	610	628

A-3.6 Inspect for Sprocket Wear

A worn out sprocket is not nearly as well defined as a worn out chain. However, there are some sprocket characteristics that indicate when a sprocket shall be replaced. Check for roughness or binding when a new chain engages or disengages the sprocket. Inspect for reduced tooth thickness and hooked tooth tips. If sprocket teeth are hooked visibly, without aid of a template, chain life may be significantly reduced, and the sprocket shall be replaced.

The new chain shall not be run on worn out sprockets because it may cause the chain to wear rapidly. The pitch of the new chain is much shorter than the effective pitch of the final sprocket tooth before disengagement. When the chain disengages from the sprocket, the roller is jerked out of the hooked portion of the sprocket tooth and that results in a shock load on the chain as the load is transferred from one tooth to the next.

A-3.7 Inspect for Sprocket Misalignment

Inspect for significant wear on the inside surfaces of the chain roller link plates and on the sprocket flange faces. If this type of wear is present, the sprockets may be misaligned. Re-align the sprockets as described in the installation instructions to prevent further abnormal chain and sprocket wear. If 5 percent or more of the link plate thickness is worn away, or if there are sharp gouges in the link plate surface, the chain shall be replaced immediately. If 10 percent or more of the sprocket tooth flange thickness is worn away, the sprocket shall be replaced.

A-3.8 Inspect Chain Tension

Measure the total midspan movement, if it exceeds the tabulated limit, adjust the center distance to obtain the desired amount of slack. If elongation exceeds the available adjustment, and wear elongation still has not exceeded 3 percent or the functional limit, remove two pitches and re-install the chain. If minimum adjustment shall not permit shortening the chain by two pitches, the chain may be shortened by one pitch, using an off-set link or an off-set section.

A-3.9 Inspect Guards

Inspect the guards to ensure they are in serviceable condition. The guards shall not be bent or deformed so that intended clearance is reduced. Any designed openings in the guard (mesh) shall not be enlarged. The guards shall not be broken or damaged, especially at or near the mounting points.

If the guards are in serviceable condition, re-install them on the drive; making sure that all fasteners are secure and that all safeguarding devices (such as presence sensors and interlocks) are functioning.

Table 10 Horsepower Ratings, Standard Single Strand Roller Chain No. 40, 12.70 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																											
	10	**25**	**50**	**100**	**200**	**300**	**400**	**500**	**700**	**900**	**1 000**	**1 200**	**1 400**	**1 600**	**1 800**	**2 100**	**2 400**	**2 700**	**3 000**	**3 500**	**4 000**	**5 000**	**6 000**	**7 000**	**8 000**
11	0.05	0.12	0.23	0.43	0.80	1.16	1.50	1.83	2.48	3.11	3.42	4.03	4.63	5.22	4.66	3.70	3.03	2.54	2.17	1.72	1.41	1.01	0.77	0.61	0.50
12	0.06	0.14	0.25	0.47	0.88	1.27	1.65	2.01	2.73	3.42	3.76	4.43	5.09	5.74	5.31	4.22	3.45	2.89	2.47	1.96	1.60	1.15	0.87	0.69	0.57
13	0.06	0.15	0.28	0.52	0.96	1.39	1.80	2.20	2.97	3.73	4.10	4.83	5.55	6.26	5.99	4.76	3.89	3.26	2.79	2.21	1.81	1.29	0.98	0.78	0.64
14	0.07	0.16	0.30	0.56	1.04	1.50	1.95	2.38	3.22	4.04	4.44	5.23	6.01	6.78	6.70	5.31	4.35	3.65	3.11	2.47	2.02	1.45	1.10	0.87	0.71
15	0.07	0.17	0.32	0.60	1.12	1.62	2.10	2.56	3.47	4.35	4.78	5.64	6.47	7.30	7.43	5.89	4.82	4.04	3.45	2.74	2.24	1.60	1.22	0.97	0.79
16	0.08	0.19	0.35	0.65	1.20	1.74	2.25	2.75	3.72	4.66	5.13	6.04	6.94	7.83	8.18	6.49	5.31	4.45	3.80	3.02	2.47	1.77	1.34	1.07	0.87
17	0.08	0.20	0.37	0.69	1.29	1.85	2.40	2.93	3.97	4.98	5.48	6.45	7.41	8.36	8.96	7.11	5.82	4.88	4.17	3.31	2.71	1.94	1.47	1.17	0.96
18	0.09	0.21	0.39	0.73	1.37	1.97	2.55	3.12	4.22	5.30	5.82	6.86	7.88	8.89	9.76	7.75	6.34	5.31	4.54	3.60	2.95	2.11	1.60	1.27	0
19	0.09	0.22	0.42	0.78	1.45	2.09	2.71	3.31	4.48	5.62	6.17	7.27	8.36	9.42	10.5	8.40	6.88	5.76	4.92	3.91	3.20	2.29	1.74	1.38	0
20	0.10	0.24	0.44	0.82	1.53	2.21	2.86	3.50	4.73	5.94	6.53	7.69	8.83	9.96	11.1	9.07	7.43	6.22	5.31	4.22	3.45	2.47	1.88	1.49	0
21	0.11	0.25	0.46	0.87	1.62	2.33	3.02	3.69	4.99	6.26	6.88	8.11	9.31	10.5	11.7	9.76	7.99	6.70	5.72	4.54	3.71	2.66	2.02	1.60	0
22	0.11	0.26	0.49	0.91	1.70	2.45	3.17	3.88	5.25	6.58	7.23	8.52	9.79	11.0	12.3	10.5	8.57	7.18	6.13	4.87	3.98	2.85	2.17	1.72	0
23	0.12	0.27	0.51	0.96	1.78	2.57	3.33	4.07	5.51	6.90	7.59	8.94	10.3	11.6	12.9	11.2	9.16	7.68	6.55	5.20	4.26	3.05	2.32	1.84	0
24	0.13	0.29	0.54	1.00	1.87	2.69	3.48	4.26	5.76	7.23	7.95	9.36	10.8	12.1	13.5	11.9	9.76	8.18	6.99	5.54	4.54	3.25	2.47	1.96	0
25	0.13	0.30	0.56	1.05	1.95	2.81	3.64	4.45	6.02	7.55	8.30	9.78	11.2	12.7	14.1	12.7	10.4	8.70	7.43	5.89	4.82	3.45	2.63	0	
26	0.14	0.31	0.58	1.09	2.04	2.93	3.80	4.64	6.28	7.88	8.66	10.2	11.7	13.2	14.7	13.5	11.0	9.23	7.88	6.25	5.12	3.66	2.79	0	
28	0.15	0.34	0.63	1.18	2.20	3.18	4.11	5.03	6.81	8.54	9.39	11.1	12.7	14.3	15.9	15.0	12.3	10.3	8.80	6.99	5.72	4.09	3.11	0	
30	0.16	0.37	0.68	1.27	2.38	3.42	4.43	5.42	7.33	9.20	10.1	11.9	13.7	15.4	17.2	16.7	13.6	11.4	9.76	7.75	6.34	4.54	3.45	0	
32	0.17	0.39	0.73	1.36	2.55	3.67	4.75	5.81	7.86	9.86	10.8	12.8	14.7	16.5	18.4	18.4	15.0	12.6	10.8	8.54	6.99	5.00	0		
35	0.19	0.43	0.81	1.50	2.81	4.04	5.24	6.40	8.66	10.9	11.9	14.1	16.2	18.2	20.3	21.0	17.2	14.4	12.3	9.76	7.99	5.72	0		
40	0.22	0.50	0.93	1.74	3.24	4.67	6.05	7.39	10.0	12.5	13.8	16.3	18.7	21.1	23.4	25.7	21.0	17.6	15.0	11.9	9.76	6.99	0		
45	0.25	0.57	1.06	1.97	3.68	5.30	6.87	8.40	11.4	14.2	15.7	18.5	21.2	23.9	26.6	30.5	25.1	21.0	17.9	14.2	11.7	0			
Type A					Type B								Type C												

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 11 Horsepower Ratings, Standard Single Strand Roller Chain No. 50, 15.88 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	**Revolutions Per Minute — Small Sprocket**																								
	10	**25**	**50**	**100**	**200**	**300**	**400**	**500**	**700**	**900**	**1 000**	**1 200**	**1 400**	**1 600**	**1 800**	**2 100**	**2 400**	**2 700**	**3 000**	**3 500**	**4 000**	**4 500**	**5 000**	**5 500**	**6 000**
11	0.11	0.24	0.45	0.84	1.56	2.25	2.92	3.57	4.83	6.06	6.66	7.85	8.13	6.65	5.58	4.42	3.62	3.04	2.59	2.06	1.68	1.41	1.20	1.04	0.92
12	0.12	0.26	0.49	0.92	1.72	2.47	3.21	3.92	5.31	6.65	7.31	8.62	9.26	7.58	6.35	5.04	4.13	3.46	2.95	2.34	1.92	1.61	1.37	1.19	1.04
13	0.13	0.29	0.54	1.00	1.87	2.70	3.50	4.27	5.78	7.25	7.97	9.40	10.4	8.55	7.16	5.69	4.65	3.90	3.33	2.64	2.16	1.81	1.55	1.34	0
14	0.14	0.31	0.58	1.09	2.03	2.92	3.79	4.63	6.27	7.86	8.64	10.2	11.7	9.55	8.01	6.35	5.20	4.36	3.72	2.95	2.42	2.03	1.73	1.50	0
15	0.15	0.34	0.63	1.17	2.19	3.15	4.08	4.99	6.75	8.47	9.31	11.0	12.6	10.6	8.88	7.05	5.77	4.83	4.13	3.27	2.68	2.25	1.92	1.66	0
16	0.16	0.36	0.67	1.26	2.34	3.38	4.37	5.35	7.24	9.08	9.98	11.8	13.5	11.7	9.78	7.76	6.35	5.32	4.55	3.61	2.95	2.47	2.11	1.83	0
17	0.17	0.39	0.72	1.34	2.50	3.61	4.67	5.71	7.73	9.69	10.7	12.6	14.4	12.8	10.7	8.50	6.96	5.83	4.98	3.95	3.23	2.71	2.31	2.01	0
18	0.18	0.41	0.76	1.43	2.66	3.83	4.97	6.07	8.22	10.3	11.3	13.4	15.3	13.9	11.7	9.26	7.58	6.35	5.42	4.30	3.52	2.95	2.52	0	
19	0.19	0.43	0.81	1.51	2.82	4.07	5.27	6.44	8.72	10.9	12.0	14.2	16.3	15.1	12.7	10.0	8.22	6.89	5.88	4.67	3.82	3.20	2.73	0	
20	0.20	0.46	0.86	1.60	2.98	4.30	5.57	6.80	9.21	11.5	12.7	15.0	17.2	16.3	13.7	10.8	8.88	7.44	6.35	5.04	4.13	3.46	2.95	0	
21	0.21	0.48	0.90	1.69	3.14	4.53	5.87	7.17	9.71	12.2	13.4	15.8	18.1	17.6	14.7	11.7	9.55	8.01	6.84	5.42	4.44	3.72	3.18	0	
22	0.22	0.51	0.95	1.77	3.31	4.76	6.17	7.54	10.2	12.8	14.1	16.6	19.1	18.8	15.8	12.5	10.2	8.59	7.33	5.82	4.76	3.99	3.41	0	
23	0.23	0.53	1.00	1.86	3.47	5.00	6.47	7.91	10.7	13.4	14.8	17.4	20.0	20.1	16.9	13.4	11.0	9.18	7.84	6.22	5.09	4.27	0		
24	0.25	0.56	1.04	1.95	3.63	5.23	6.78	8.29	11.2	14.1	15.5	18.2	20.9	21.4	18.0	14.3	11.7	9.78	8.35	6.63	5.42	4.55	0		
25	0.26	0.58	1.09	2.03	3.80	5.47	7.08	8.66	11.7	14.7	16.2	19.0	21.9	22.8	19.1	15.2	12.4	10.4	8.88	7.05	5.77	4.83	0		
26	0.27	0.61	1.14	2.12	3.96	5.70	7.39	9.03	12.2	15.3	16.9	19.9	22.8	24.2	20.3	16.1	13.2	11.0	9.42	7.47	6.12	5.13	0		
28	0.29	0.66	1.23	2.30	4.29	6.18	8.01	9.79	13.2	16.6	18.3	21.5	24.7	27.0	22.6	18.0	14.7	12.3	10.5	8.35	6.84	5.73	0		
30	0.31	0.71	1.33	2.48	4.62	6.66	8.63	10.5	14.3	17.9	19.7	23.2	26.6	30.0	25.1	19.9	16.3	13.7	11.7	9.26	7.58	0			
32	0.33	0.76	1.42	2.66	4.96	7.14	9.25	11.3	15.3	19.2	21.1	24.9	28.6	32.2	27.7	22.0	18.0	15.1	12.9	10.2	8.35	0			
35	0.37	0.84	1.57	2.93	5.46	7.86	10.2	12.5	16.9	21.1	23.2	27.4	31.5	35.5	31.6	25.1	20.6	17.2	14.7	11.7	9.55	0			
40	0.43	0.97	1.81	3.38	6.31	9.08	11.8	14.4	19.5	24.4	26.8	31.6	36.3	41.0	38.7	30.7	25.1	21.0	18.0	14.3	0				
45	0.48	1.10	2.06	3.84	7.16	10.3	13.4	16.3	22.1	27.7	30.5	35.9	41.3	46.5	46.1	36.6	30.0	25.1	21.4		0				
	Type A				Type B					Type C															

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 12 Horsepower Ratings, Standard Single Strand Roller Chain No. 60, 19.05 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																							
	10	25	50	100	150	200	300	400	500	600	700	800	900	1 000	1 100	1 200	1 400	1 600	1 800	2 000	2 500	3 000	3 500	4 000	4 500
11	0.18	0.41	0.77	1.44	2.07	2.69	3.87	5.02	6.13	7.23	8.30	9.36	10.4	11.4	12.5	11.9	9.41	7.70	6.45	5.51	3.94	3.00	2.38	1.95	1.63
12	0.20	0.45	0.85	1.58	2.28	2.95	4.25	5.51	6.74	7.94	9.12	10.3	11.4	12.6	13.7	13.5	10.7	8.77	7.35	6.28	4.49	3.42	2.71	2.22	1.86
13	0.22	0.50	0.92	1.73	2.49	3.22	4.64	6.01	7.34	8.65	9.94	11.2	12.5	13.7	14.9	15.2	12.1	9.89	8.29	7.08	5.06	3.85	2.06	2.50	0
14	0.24	0.54	1.00	1.87	2.69	3.49	5.02	6.51	7.96	9.37	10.8	12.1	13.5	14.8	16.2	17.0	13.5	11.1	9.26	7.91	5.66	4.31	3.42	2.80	0
15	0.25	0.58	1.08	2.01	2.90	3.76	5.41	7.01	8.57	10.1	11.6	13.1	14.5	16.0	17.4	18.8	15.0	12.3	10.3	8.77	6.28	4.77	3.79	3.10	0
16	0.27	0.62	1.16	2.16	3.11	4.03	5.80	7.52	9.19	10.8	12.4	14.0	15.6	17.1	18.7	20.2	16.5	13.5	11.3	9.66	6.91	5.26	4.17	3.42	0
17	0.29	0.66	1.24	2.31	3.32	4.30	6.20	8.03	9.81	11.6	13.3	15.0	16.7	18.3	19.9	21.6	18.1	14.8	12.4	10.6	7.57	5.76	4.57	3.74	0
18	0.31	0.70	1.31	2.45	3.53	4.58	6.59	8.54	10.4	12.3	14.1	15.9	17.7	19.5	21.2	22.9	19.7	16.1	13.5	11.5	8.25	6.28	4.98	4.08	0
19	0.33	0.75	1.39	2.60	3.74	4.85	6.99	9.05	11.1	13.0	15.0	16.9	18.8	20.6	22.5	24.3	21.4	17.5	14.6	12.5	8.95	6.81	5.40	4.42	0
20	0.35	0.79	1.47	2.75	3.96	5.13	7.38	9.57	11.7	13.8	15.8	17.9	19.8	21.8	23.8	25.7	23.1	18.9	15.8	13.5	9.66	7.35	5.83	0	
21	0.36	0.83	1.55	2.90	4.17	5.40	7.78	10.1	12.3	14.5	16.7	18.8	20.9	23.0	25.1	27.1	24.8	20.3	17.0	14.5	10.4	7.91	6.28	0	
22	0.38	0.87	1.63	3.05	4.39	5.68	8.19	10.6	13.0	15.3	17.5	19.8	22.0	24.2	26.4	28.5	26.6	21.8	18.2	15.6	11.1	8.48	6.73	0	
23	0.40	0.92	1.71	3.19	4.60	5.96	8.59	11.1	13.6	16.0	18.4	20.8	23.1	25.4	27.7	29.9	28.4	23.3	19.5	16.7	11.9	9.07	7.19	0	
24	0.42	0.96	1.79	3.35	4.82	6.24	8.99	11.6	14.2	16.8	19.3	21.7	24.2	26.6	29.0	31.3	30.3	24.8	20.8	17.8	12.7	9.66	7.67	0	
25	0.44	1.00	1.87	3.50	5.04	6.52	9.40	12.2	14.9	17.5	20.1	22.7	25.3	27.8	30.3	32.7	32.2	26.4	22.1	18.9	13.5	10.3	8.15	0	
26	0.46	1.05	1.95	3.65	5.25	6.81	9.80	12.7	15.5	18.3	21.0	23.7	26.4	29.0	31.6	34.1	34.2	28.0	23.4	20.0	14.3	10.9	8.65	0	
28	0.50	1.13	2.12	3.95	5.69	7.37	10.6	13.8	16.8	19.8	22.8	25.7	28.5	31.4	34.2	37.0	38.2	31.3	26.2	22.4	16.0	12.2	0		
30	0.54	1.22	2.28	4.26	6.13	7.94	11.4	14.8	18.1	21.4	24.5	27.7	30.8	33.8	36.8	39.8	42.4	34.7	29.1	24.8	17.8	13.5	0		
32	0.57	1.31	2.45	4.56	6.57	8.52	12.3	15.9	19.4	22.9	26.3	29.7	33.0	36.3	39.5	42.7	46.7	38.2	32.0	27.3	19.6	14.9	0		
35	0.63	1.44	2.69	5.03	7.24	9.38	13.5	17.5	21.4	25.2	29.0	32.7	36.3	39.9	43.5	47.1	53.4	43.7	36.6	31.3	22.4	17.0	0		
40	0.73	1.67	3.11	5.81	8.37	10.8	15.6	20.2	24.7	29.1	33.5	37.7	42.0	46.1	50.3	54.4	62.5	53.4	44.7	38.2	27.3	0			
45	0.83	1.89	3.53	6.60	9.50	12.3	17.7	23.0	28.1	33.1	38.0	42.9	47.7	52.4	57.1	61.7	70.9	63.7	53.4	45.6	32.6	0			
Type A				Type B							Type C														

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 13 Horsepower Ratings, Standard Single Strand Roller Chain No. 80, 25.40 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																							
	10	25	50	100	150	200	300	400	500	600	700	800	900	1 000	1 100	1 200	1 400	1 600	1 800	2 000	2 200	2 400	2 700	3 000	3 400
11	0.42	0.97	1.80	3.36	4.84	6.28	9.04	11.7	14.3	16.9	19.4	21.9	23.0	19.6	17.0	14.9	11.8	9.69	8.12	6.93	6.01	5.27	4.42	3.77	1.70
12	0.47	1.06	1.98	3.69	5.32	6.89	9.93	12.9	15.7	18.5	21.3	24.0	26.2	22.3	19.4	17.0	13.5	11.0	9.25	7.90	6.85	6.01	5.04	4.30	0
13	0.51	1.16	2.16	4.03	5.80	7.52	10.8	14.0	17.1	20.2	23.2	26.2	29.1	25.2	21.8	19.2	15.2	12.5	10.4	8.19	7.72	6.78	5.68	4.85	0
14	0.55	1.25	2.34	4.36	6.29	8.14	11.7	15.2	18.6	21.9	25.1	28.4	31.5	28.2	24.4	21.4	17.0	13.9	11.7	9.96	8.63	7.57	6.35	5.42	0
15	0.59	1.35	2.52	4.70	6.77	8.77	12.6	16.4	20.0	23.6	27.1	30.6	34.0	31.2	27.1	23.8	18.9	15.4	12.9	11.0	9.57	8.40	7.04	6.01	0
16	0.63	1.45	2.70	5.04	7.26	9.41	13.5	17.6	21.5	25.3	29.0	32.8	36.4	34.4	29.8	26.2	20.8	17.0	14.2	12.2	10.5	9.25	7.76	6.62	0
17	0.68	1.55	2.88	5.38	7.75	10.0	14.5	18.7	22.9	27.0	31.0	35.0	38.9	37.7	32.7	28.7	22.7	18.6	15.6	13.3	11.5	10.1	8.49	7.25	0
18	0.72	1.64	3.07	5.72	8.25	10.7	15.4	19.9	24.4	28.7	33.0	37.2	41.4	41.1	35.6	31.2	24.8	20.3	17.0	14.5	12.6	11.0	9.25	7.90	0
19	0.76	1.74	3.25	6.07	8.74	11.3	16.3	21.1	25.8	30.4	35.0	39.4	43.8	44.5	38.6	33.9	26.9	22.0	18.4	15.7	13.6	12.0	10.0	8.57	0
20	0.81	1.84	3.44	6.41	9.24	12.0	17.2	22.3	27.3	32.2	37.0	41.7	46.3	48.1	41.7	36.6	29.0	23.8	19.9	17.0	14.7	12.9	10.8	0	
21	0.85	1.94	3.62	6.76	9.74	12.6	18.2	23.5	28.8	33.9	39.0	43.9	48.9	51.7	44.8	39.4	31.2	25.6	21.4	18.3	15.9	13.9	11.7	0	
22	0.90	2.04	3.81	7.11	10.2	13.3	19.1	24.8	30.3	35.7	41.0	46.2	51.4	55.5	48.1	42.2	33.5	27.4	23.0	19.6	17.0	14.9	12.5	0	
23	0.94	2.14	4.00	7.46	10.7	13.9	20.1	26.0	31.8	37.4	43.0	48.5	53.9	59.3	51.4	45.1	35.8	29.3	24.6	21.0	18.2	15.9	13.4	0	
24	0.98	2.24	4.19	7.81	11.3	14.6	21.0	27.2	32.2	39.2	45.0	50.8	56.4	62.0	54.8	48.1	38.2	31.2	26.2	22.3	19.4	17.0	14.2	0	
25	1.03	2.34	4.37	8.16	11.8	15.2	21.9	28.4	34.7	40.9	47.0	53.0	59.0	64.8	58.2	51.1	40.6	33.2	27.8	23.8	20.6	18.1	15.1	0	
26	1.07	2.45	4.56	8.52	12.3	15.9	22.9	29.7	36.2	42.7	49.1	55.3	61.5	67.6	61.8	54.2	43.0	35.2	29.5	25.2	21.8	19.2	16.1	0	
28	1.16	2.65	4.94	9.23	13.3	17.2	24.8	32.1	39.3	46.3	53.2	59.9	66.7	73.3	69.0	60.6	48.1	39.4	33.0	28.2	24.4	21.4	0		
30	1.25	2.85	5.33	9.94	14.3	18.5	26.7	34.6	42.3	49.9	57.3	64.6	71.8	78.9	76.6	67.2	53.3	43.6	36.6	31.2	27.1	23.8	0		
32	1.34	3.06	5.71	10.7	15.3	19.9	28.6	37.1	45.4	53.5	61.4	69.2	77.0	84.6	84.3	74.0	58.7	48.1	40.3	34.4	29.8	26.2	0		
35	1.48	3.37	6.29	11.7	16.9	21.9	31.6	40.9	50.0	58.9	67.6	76.3	84.8	93.3	96.5	84.7	67.2	55.0	46.1	39.4	34.1	0			
40	1.71	3.89	7.27	13.6	19.5	25.3	36.4	47.2	57.7	68.0	78.1	88.1	99.0	108	117	103	82.1	67.2	56.3	48.1	20.0	0			
45	1.94	4.42	8.25	15.4	22.2	28.7	41.4	53.6	65.6	77.2	88.7	100	111	122	133	123	98.0	80.2	67.2	54.1	0				
Type A			Type B						Type C																

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 14 Horsepower Ratings, Standard Single Strand Roller Chain No. 100, 31.75 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																								
	10	**25**	**50**	**100**	**150**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1 000**	**1 100**	**1 200**	**1 300**	**1 400**	**1 600**	**1 800**	**2 000**	**2 200**	**2 400**	**2 600**	**2 700**
11	0.81	1.85	3.45	6.44	9.28	12.0	17.3	22.4	27.4	32.3	37.1	32.8	27.5	23.4	20.3	17.8	15.8	14.2	11.6	9.71	8.29	7.19	6.31	1.29	0
12	0.89	2.03	3.79	7.08	10.2	13.2	19.0	24.6	30.1	35.5	40.8	37.3	31.3	26.7	23.2	20.3	18.0	16.1	13.2	11.1	9.45	8.19	7.19	0	
13	0.97	2.22	4.13	7.72	11.1	14.4	20.7	26.9	32.8	38.7	44.5	42.1	35.3	30.1	26.1	22.9	20.3	18.2	14.9	12.5	10.6	9.23	8.10	0	
14	1.05	2.40	4.48	8.36	12.0	15.6	22.5	29.1	35.6	41.9	48.2	47.0	39.4	33.7	29.2	25.6	22.7	20.3	16.6	13.9	11.9	10.3	9.05	0	
15	1.13	2.59	4.83	9.01	13.0	16.8	24.2	31.4	38.3	45.2	51.9	52.2	43.7	37.3	32.4	28.4	25.2	22.5	18.4	15.5	13.2	11.4	10.0	0	
16	1.22	2.77	5.17	9.66	13.9	18.0	26.0	33.6	41.1	48.4	55.6	57.5	48.2	41.1	35.7	31.3	27.7	24.8	20.3	17.0	14.5	12.6	11.1	0	
17	1.30	2.96	5.52	10.3	14.8	19.2	27.7	35.9	43.9	51.7	59.4	63.0	52.8	45.0	39.0	34.3	30.4	27.2	22.3	18.7	15.9	13.8	0.79	0	
18	1.38	3.15	5.88	11.0	15.8	20.5	29.5	38.2	46.7	55.0	63.2	68.6	57.5	49.1	42.5	37.3	33.1	29.6	24.2	20.3	17.4	15.0	0		
19	1.46	3.34	6.23	11.6	16.7	21.7	31.2	40.5	49.5	58.3	67.0	74.4	62.3	53.2	46.1	40.5	35.9	32.1	26.3	22.0	18.8	16.3	0		
20	1.55	3.53	6.58	12.3	17.7	22.9	33.0	42.8	52.3	61.6	70.8	79.8	67.3	57.5	49.8	43.7	38.8	34.7	28.4	23.8	20.3	17.6	0		
21	1.63	3.72	6.94	13.0	18.7	24.2	34.8	45.1	55.1	65.0	74.6	84.2	72.4	61.8	53.6	47.0	41.7	37.3	30.6	25.6	21.9	19.0	0		
22	1.71	3.91	7.30	13.6	19.6	25.4	36.6	47.4	58.0	68.3	78.5	88.5	77.7	66.3	57.5	50.4	44.7	40.0	32.8	27.5	23.4	20.3	0		
23	1.80	4.10	7.66	14.3	20.6	26.7	38.4	49.8	60.8	71.7	82.3	92.8	83.0	70.9	61.4	53.9	47.8	42.8	35.0	29.4	25.1	7.74	0		
24	1.88	4.30	8.02	15.0	21.5	27.9	40.2	52.1	63.7	75.0	86.2	97.2	88.5	75.6	65.5	57.5	51.0	45.6	37.3	31.3	26.7	0			
25	1.97	4.49	8.38	15.6	22.5	29.2	42.0	54.4	66.6	78.4	90.1	102	94.1	80.3	69.6	61.1	54.2	48.5	39.7	33.3	28.4	0			
26	2.05	4.68	8.74	16.3	23.5	30.4	43.8	56.8	69.4	81.8	94.0	106	99.8	85.2	73.8	64.8	57.5	51.4	42.1	35.3	30.1	0			
28	2.22	5.07	9.47	17.7	25.5	33.0	47.5	61.5	75.2	88.6	102	115	112	95.2	82.5	72.4	64.2	57.5	47.0	39.4	33.7	0			
30	2.40	5.47	10.2	19.0	27.4	35.5	51.2	66.3	81.0	95.5	110	124	124	106	91.5	80.3	71.2	63.7	52.2	43.7	10.0	0			
32	2.57	5.86	10.9	20.4	29.4	38.1	54.9	71.1	86.9	102	118	133	136	116	101	88.5	78.5	70.2	57.5	45.2	0				
35	2.83	6.46	12.0	22.5	32.4	42.0	60.4	78.3	95.7	113	130	146	156	133	115	101	89.8	80.3	65.8	55.1	0				
40	3.27	7.46	13.9	26.0	37.4	48.5	69.8	90.4	111	130	150	169	188	163	141	124	110	98.1	80.3	0					
45	3.71	8.47	15.8	29.5	42.5	55.0	79.3	103	126	148	170	192	213	194	168	148	131	117	45.3	0					
Type A			Type B				Type C																		

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 15 Horsepower Ratings, Standard Single Strand Roller Chain No. 120, 38.10 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																						
	10	25	50	100	150	200	300	400	500	600	700	800	900	1 000	1 100	1 200	1 300	1 400	1 500	1 600	1 700	1 800	1 900	2 000	2 100
11	1.37	3.12	5.83	10.9	15.7	20.3	29.2	37.9	46.3	54.6	46.3	37.9	31.8	27.1	23.5	20.6	18.3	16.4	14.8	13.4	12.2	11.2	10.4	9.59	0
12	1.50	3.43	6.40	11.9	17.2	22.3	32.1	41.6	50.9	59.9	52.8	43.2	36.2	30.9	26.8	23.5	20.9	18.7	16.8	15.3	13.9	12.8	11.8	10.9	0
13	1.64	3.74	6.98	13.0	18.8	24.3	35.0	45.4	55.5	65.3	59.5	48.7	40.8	34.9	30.2	26.5	23.5	21.0	19.0	17.2	15.7	14.4	13.3	12.3	0
14	1.78	4.05	7.56	14.1	20.3	26.3	37.9	49.1	60.1	70.8	66.5	54.4	45.6	39.0	33.8	29.6	26.3	23.5	21.2	19.2	17.6	16.1	14.9	8.94	0
15	1.91	4.37	8.15	15.2	21.9	28.4	40.9	53.0	64.7	76.3	73.8	60.4	50.6	43.2	37.4	32.9	29.1	26.1	23.5	21.3	19.5	17.9	16.5	0	
16	2.05	4.68	8.74	16.3	23.5	30.4	43.8	56.8	69.4	81.8	81.3	66.5	55.7	47.6	41.2	36.2	32.1	28.7	25.9	23.5	21.5	19.7	18.2	0	
17	2.19	5.00	9.33	17.4	25.1	32.5	46.8	60.6	74.1	87.3	89.0	72.8	61.0	52.1	45.2	39.6	35.2	31.5	28.4	25.8	23.5	21.6	19.9	0	
18	2.33	5.32	9.92	18.5	26.7	34.6	49.8	64.5	78.8	92.9	97.0	79.4	66.5	56.8	49.2	43.2	38.3	34.3	30.9	28.1	25.6	23.5	11.3	0	
19	2.47	5.64	10.5	19.6	28.3	36.6	52.8	68.4	83.6	98.5	105	86.1	72.1	61.6	53.4	46.8	41.5	37.2	33.5	30.4	27.8	25.5	0		
20	2.61	5.96	11.1	20.7	29.9	38.7	55.8	72.7	88.3	104	114	92.9	77.9	66.5	57.6	50.6	44.9	40.1	36.2	32.9	30.0	27.5	0		
21	2.75	6.28	11.7	21.9	31.5	40.8	58.8	76.2	93.1	110	122	100	83.8	71.6	62.0	54.4	48.3	43.2	39.0	35.4	32.3	29.6	0		
22	2.90	6.60	12.3	23.0	33.1	42.9	61.8	80.1	97.9	115	131	107	89.9	76.7	66.5	58.4	51.8	46.3	41.8	37.9	34.6	16.6	0		
23	3.04	6.93	12.9	24.1	34.8	45.0	64.9	84.0	103	121	139	115	96.1	82.0	71.1	62.4	55.3	49.5	44.6	40.5	37.0	0			
24	3.18	7.25	13.5	25.3	36.4	47.1	67.9	88.0	108	127	146	122	102	87.4	75.8	66.5	59.0	52.8	47.6	43.2	39.4	0			
25	3.32	7.58	14.1	26.4	38.0	49.3	71.0	91.9	112	132	152	130	109	92.9	80.6	70.7	62.7	56.1	50.6	45.9	41.3	0			
26	3.47	7.91	14.8	27.5	39.7	51.4	74.0	95.9	117	138	159	138	115	98.6	85.4	75.0	66.5	59.5	53.7	48.7	26.6	0			
28	3.76	8.57	16.0	29.8	43.0	55.7	80.2	104	127	150	172	154	129	110	95.5	83.8	74.3	66.5	60.0	54.4	0				
30	4.05	9.23	17.2	32.1	46.3	60.0	86.4	112	137	161	185	171	143	122	106	92.9	82.4	73.8	66.5	42.4	0				
32	4.34	9.90	18.5	34.5	49.6	64.3	92.6	120	147	173	199	188	158	135	117	102	90.8	81.3	73.3	0					
35	4.78	10.9	20.3	38.0	54.7	70.9	102	132	162	190	219	215	180	154	133	117	104	92.9	47.7	0					
40	5.52	12.6	23.5	43.9	63.2	81.8	118	153	187	220	253	263	220	188	163	143	127	59.5	0						
45	6.27	14.3	26.7	49.8	71.7	92.9	134	173	212	250	287	314	263	224	195	171	80	0							
Type A		Type B					Type C																	

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 16 Horsepower Ratings, Standard Single Strand Roller Chain No. 140, 44.45 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																							
	10	**25**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**700**	**800**	**900**	**1 000**	**1 100**	**1 200**	**1 300**	**1 400**	**1 500**	**1 600**	**1 700**
11	2.12	4.83	9.02	16.8	24.2	31.4	38.4	45.2	52.0	58.6	65.2	71.6	75.2	66.0	52.4	42.9	35.9	30.7	26.6	23.3	20.7	18.5	16.7	15.2	0
12	2.33	5.31	9.91	18.5	26.6	34.5	42.2	49.7	57.1	64.4	71.6	78.7	85.7	75.2	59.7	48.9	41.0	35.0	30.3	26.6	23.6	21.1	19.0	17.3	0
13	2.54	5.79	10.8	20.2	29.0	37.6	46.0	54.2	62.2	70.2	78.0	85.8	93.5	84.8	67.3	55.1	46.2	39.4	34.2	30.0	26.6	23.8	21.5	19.5	0
14	2.75	6.27	11.7	21.8	31.5	40.8	49.8	58.7	67.4	76.0	84.5	93.0	101	94.8	75.2	61.6	51.6	44.1	38.2	33.5	29.7	26.6	24.0	21.8	0
15	2.96	6.76	12.6	23.5	33.9	43.9	53.7	63.2	72.7	81.9	91.1	100	109	105	83.4	68.3	57.2	48.9	42.4	37.2	33.0	29.5	26.6	0.00	
16	3.18	7.24	13.5	25.2	36.3	47.1	57.5	67.8	77.9	87.8	97.7	107	117	116	91.9	75.2	63.1	53.8	46.7	41.0	36.3	32.5	29.3	0.00	
17	3.39	7.73	14.4	26.9	38.8	50.3	61.4	72.4	83.2	93.8	104	115	125	127	101	82.4	69.1	59.0	51.1	44.9	39.8	35.6	32.1	0.00	
18	3.61	8.23	15.4	28.6	41.3	53.5	65.3	77.0	88.5	99.8	111	122	133	138	110	89.8	75.2	64.2	55.7	48.9	43.3	38.8	35.0	0.00	
19	3.82	8.72	16.3	30.4	43.7	56.7	69.3	81.6	93.8	106	118	129	141	150	119	97.4	81.6	69.7	60.4	53.0	47.0	42.1	37.9	0.00	
20	4.04	9.22	17.2	32.1	46.2	59.9	73.2	86.3	99.1	112	124	137	149	161	128	105	88.1	75.2	65.2	57.2	50.8	45.4	0		
21	4.26	9.72	18.1	33.8	48.7	63.1	77.2	91.0	104	118	131	144	157	170	138	113	94.8	80.9	70.2	61.6	54.6	48.9	0		
22	4.48	10.2	19.1	35.6	51.3	66.4	81.2	95.6	110	124	138	151	165	178	148	121	102	86.8	75.2	66.0	58.6	52.4	0		
23	4.70	10.7	20.0	37.3	53.8	69.7	85.2	100	115	130	145	159	173	187	158	130	109	92.8	80.4	70.6	62.6	56.0	0		
24	4.92	11.2	20.9	39.1	56.3	72.9	89.2	105	121	136	151	166	181	196	169	138	116	98.9	85.7	75.2	66.7	59.7	0		
25	5.14	11.7	21.9	40.8	58.8	76.2	93.2	110	126	142	158	174	189	205	180	147	123	105	91.1	80.0	70.9	63.5	0		
26	5.37	12.2	22.8	42.6	61.4	79.5	97.2	115	132	148	165	181	198	214	190	156	131	112	96.7	84.8	75.2	0			
28	5.81	13.3	24.7	46.2	66.5	86.2	105	124	143	161	179	197	214	232	213	174	146	125	108	94.8	84.1	0			
30	6.26	14.3	26.7	49.7	71.6	92.8	113	134	154	173	193	212	231	249	236	193	162	138	120	105	93.2	0			
32	6.71	15.3	28.6	53.3	76.8	99.5	122	143	165	186	206	227	247	267	260	213	178	152	132	116	0				
35	7.40	16.9	31.5	58.7	84.6	110	134	158	181	205	227	250	272	295	297	243	204	174	151	130	0				
40	8.54	19.5	36.4	67.9	97.7	127	155	182	210	236	263	289	315	340	363	297	249	213	178	0					
45	9.70	22.1	41.3	77.1	111	144	176	207	238	268	298	328	357	387	434	355	297	237	92.7	0					
TypeA				Type B											Type C										

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 17 Horsepower Ratings, Standard Single Strand Roller Chain No. 160, 50.80 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																								
	10	**25**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**	**750**	**800**	**850**	**900**	**1 000**	**1 100**	**1 200**	**1 300**	**1 400**
11	3.07	7.01	13.1	24.4	35.2	45.6	55.7	65.6	75.4	85.0	94.5	96.6	83.7	73.5	65.2	58.3	52.6	47.7	43.6	40.0	34.1	29.6	26.0	23.0	0
12	3.38	7.70	14.4	26.8	38.6	50.1	61.2	72.1	82.8	93.4	104	110	95.4	83.7	74.2	66.4	59.9	54.4	49.6	45.6	38.9	33.7	29.6	26.3	0
13	3.68	8.40	15.7	29.2	42.1	54.6	66.7	78.6	90.3	102	113	124	108	94.4	83.7	74.9	67.5	61.3	56.0	51.4	43.9	38.0	33.4	29.6	0
14	3.99	9.10	17.0	31.7	45.6	59.1	72.3	85.2	97.8	110	123	135	120	105	93.6	83.7	75.5	68.5	62.6	57.4	49.0	42.5	37.3	33.1	0
15	4.30	9.80	18.3	34.1	49.2	63.7	77.9	91.7	105	119	132	145	133	117	104	92.8	83.7	76.0	69.4	63.7	54.5	47.1	41.4	0	
16	4.61	10.5	19.6	36.6	52.7	68.3	83.5	98.4	113	127	142	156	147	129	114	102	92.2	83.7	76.4	70.2	59.9	51.9	45.6	0	
17	4.92	11.2	20.9	39.1	56.3	72.9	89.1	105	121	136	151	166	161	141	125	112	101	91.7	83.7	76.8	65.6	56.9	49.9	0.0	
18	5.23	11.9	22.3	41.6	59.9	77.6	94.8	112	128	145	161	177	175	154	136	122	110	99.9	91.2	83.7	71.5	62.0	54.4	0	
19	5.55	12.7	23.6	44.1	63.5	82.2	101	118	136	153	171	188	190	167	148	132	119	108	98.9	90.8	77.5	67.2	59.0	0	
20	5,86	13.4	25.0	46.6	67.1	86.9	106	125	144	162	180	198	205	180	160	143	129	117	107	98.1	83.7	72.6	63.7	0	
21	6.18	14.1	26.3	49.1	70.7	91.6	112	132	152	171	190	209	221	194	172	154	139	126	115	105	90.1	78.1	68.5	0	
22	6.50	14.8	27.7	51.6	74.4	96.3	118	139	159	180	200	220	237	208	184	165	149	135	123	113	96.6	83.7	0		
23	6.82	15.6	29.0	54.2	78.0	101	124	146	167	189	210	231	251	222	197	176	159	144	132	121	103	89.5	0		
24	7.14	16.3	30.4	56.7	81.7	106	129	152	175	197	220	241	263	237	210	188	169	154	140	129	110	95.4	0		
25	7.46	17.0	31.8	59.3	85.4	111	135	159	183	206	229	252	275	252	223	200	180	164	149	137	117	101	0		
26	7.78	17.8	33.1	61.8	89.1	115	141	166	191	215	239	263	287	267	237	212	191	173	158	145	125	108	0		
28	8.43	19.2	35.9	67.0	96.5	125	153	180	207	233	259	285	311	298	265	237	214	194	177	162	139	120	0		
30	9.08	20.7	38.7	72.7	104	135	165	194	223	251	279	307	336	331	293	263	237	215	196	180	154	0			
32	9.74	22.2	41.5	77.4	111	144	176	208	239	269	300	329	359	365	323	289	261	237	216	198	169	0			
35	10.7	24.5	45.7	85.2	123	159	194	229	263	297	330	363	395	417	370	331	298	271	247	227	180	0			
40	12.4	28.3	52.8	98.5	142	184	225	265	304	343	381	419	457	494	452	404	365	331	302	257	0				
45	14.1	32.1	59.9	112	161	209	255	301	345	389	433	476	519	561	539	482	418	348	271	189	0				
Type A		Type B			Type C																				

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 18 Horsepower Ratings, Standard Single Strand Roller Chain No. 180, 57.15 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																								
	10	25	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1 000	1 050	1 100	1 150
11	4.24	9.68	18.1	33.7	48.6	62.9	76.9	90.6	104	117	124	106	92.0	80.7	71.6	64.1	57.8	52.4	47.9	46.9	40.5	37.5	34.9	32.5	0
12	4.66	10.6	19.8	37.0	53.4	69.1	84.5	99.6	114	129	142	121	105	92.0	81.6	73.0	65.8	59.7	54.6	50.1	46.2	42.8	39.7	37.1	0
13	5.08	11.6	21.6	40.4	58.2	75.4	92.1	109	125	141	156	136	118	104	92.0	82.3	74.2	67.4	61.5	56.5	52.1	48.2	44.8	0	
14	5.51	12.6	23.4	43.7	63.0	81.6	99.8	118	135	152	169	152	132	116	103	92.0	82.9	75.3	68.7	63.1	58.2	53.9	50.1	0	
15	5.93	13.5	25.3	47.1	67.9	88.0	108	127	146	164	182	169	146	129	114	102	92.0	83.5	76.2	70.0	64.5	59.7	55.5	0	
16	6.36	14.5	27.1	50.5	72.8	94.3	115	136	156	176	196	186	161	142	126	112	101	92.0	84.0	77.1	71.1	65.8	61.2	0	
17	6.79	15.5	28.9	54.0	77.7	101	123	145	167	188	209	204	177	155	138	123	111	101	92.0	84.4	77.9	72.1	0		
18	7.22	16.5	30.8	57.4	82.7	107	131	154	177	200	222	222	193	169	150	134	121	110	100	92.0	84.8	78.5	0		
19	7.66	17.5	32.6	60.8	87.6	114	139	164	188	212	236	241	209	183	163	145	131	110	109	99.8	92.0	85.2	0		
20	8.10	18.5	34.5	64.3	92.6	120	147	173	199	224	249	260	226	198	176	157	142	129	117	108	99.3	92.0	0		
21	8.53	19.5	36.3	67.8	97.6	126	155	182	209	236	262	280	243	213	189	169	152	138	126	116	107	99.0	0		
22	8.97	20.5	38.2	71.3	103	133	163	192	220	248	276	300	260	228	203	181	163	148	135	124	115	0			
23	9.41	21.5	40.1	74.8	108	140	171	201	231	260	290	318	278	244	216	194	175	159	145	133	123	0			
24	9.86	22.5	42.0	78.3	113	146	179	210	242	273	303	333	296	260	231	206	186	169	154	142	131	0			
25	10.3	23.5	43.9	81.8	118	153	187	220	253	285	317	348	315	277	245	220	198	180	164	151	139	0			
26	10.7	24.5	45.7	85.7	123	159	195	229	264	297	331	363	334	293	260	233	210	191	174	160	0				
28	11.6	26.6	49.6	92.5	133	173	211	249	286	322	358	394	374	328	291	260	235	213	194	178	0				
30	12.5	28.6	53.4	99.6	144	186	227	268	308	347	386	424	414	364	322	289	260	236	216	198	0				
32	13.4	30.7	57.2	107	154	199	244	287	330	372	414	455	456	401	355	318	287	260	238	0					
35	14.8	33.8	63.1	118	170	220	268	316	363	410	456	501	522	458	406	364	328	291	220	0					
40	17.1	39.0	72.9	136	196	254	310	365	420	473	526	579	575	524	465	398	324	244	0						
45	19.4	44.3	82.7	154	222	288	352	415	477	538	598	631	578	514	441	360	271	0							
Type A		Type B			Type C																				

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* **A-2** for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 19 Horsepower Ratings, Standard Single Strand Roller Chain No. 200, 63.50 mm Pitch

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	Revolutions Per Minute — Small Sprocket																			
	10	**15**	**20**	**30**	**40**	**50**	**70**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**
11	5.64	8.12	10.5	15.1	19.6	24.0	32.5	44.8	64.5	83.5	102	120	138	156	135	115	100	87.8	77.9	0
12	6.19	8.92	11.6	16.6	21.6	26.4	35.7	49.2	70.8	91.8	112	132	152	171	154	132	114	100	0	
13	6.75	9.72	12.6	18.1	23.5	28.7	38.9	53.6	77.2	100	122	144	166	187	174	148	129	113	0	
14	7.31	10.5	13.6	19.7	25.5	31.1	42.1	58.1	83.7	108	132	156	179	202	194	166	144	126	0	
15	7.88	11.3	14.7	21.2	27.4	33.5	45.4	62.6	90.1	117	143	168	193	218	215	184	159	140	0	
16	8.45	12.2	15.8	22.7	29.4	36.0	48.7	67.1	96.6	125	153	180	207	234	237	203	176	154	0	
17	9.02	13.0	16.8	24.2	31.4	38.4	52.0	71.6	103	134	163	193	221	249	260	222	192	169	0	
18	9.59	13.8	17.9	25.8	33.4	40.8	55.3	76.2	110	142	174	205	235	265	283	242	209	184	0	
19	10.2	14.6	19.0	27.3	35.4	43.3	58.6	80.8	116	151	184	217	249	281	307	262	227	199	0	
20	10.7	15.5	20.1	28.9	37.4	45.8	61.9	85.4	123	159	195	229	264	297	331	283	245	0		
21	11.3	16.3	21.1	30.5	39.5	48.2	65.3	90.0	130	168	205	242	278	313	348	305	264	0		
22	11.9	17.2	22.2	32.0	41.5	50.7	68.7	94.6	136	177	216	254	292	330	366	327	283	0		
23	12.5	18.0	23.3	33.6	43.5	53.2	72.0	99.3	143	185	226	267	307	346	384	349	303	0		
24	13.1	18.9	24.4	35.2	45.6	55.7	75.4	104	150	194	237	279	321	362	402	372	323	0		
25	13.7	19.7	25.5	36.8	47.6	58.2	78.8	109	156	203	248	292	335	378	421	396	343	0		
26	14.3	20.6	26.6	38.4	49.7	60.7	82.2	113	163	212	259	305	350	395	439	420	364	0		
Type A			Type B							Type C										

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* A-2 for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Table 20 Horsepower Ratings, Standard Single Strand Roller Chain No. 240, 76.20 mm

(*Clauses* A-1.1.1 *and* A-1.3)

No. of Teeth in Small Spkt	**Revolutions Per Minute — Small Sprocket**																				
	5	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**
11	4.86	9.08	13.1	16.9	20.7	24.4	31.6	38.6	45.5	59.0	72.1	88.1	104	119	135	164	194	223	187	156	0
12	5.34	9.97	14.4	18.6	22.7	26.8	34.7	42.4	50.0	64.8	79.2	96.8	114	131	148	181	213	245	213	0	
13	5.83	10.9	15.7	20.3	24.8	29.2	37.9	46.3	54.5	70.6	86.4	106	124	143	161	197	232	267	240	0	
14	6.31	11.8	17.0	22.0	26.9	31.7	41.0	50.1	59.1	76.5	93.6	114	135	155	175	213	251	289	268	0	
15	6.80	12.7	18.3	23.7	28.9	34.1	44.2	54.0	63.6	82.4	101	123	145	167	188	230	271	311	297	0	
16	7.29	13.6	19.6	25.4	31.0	36.6	47.4	57.9	68.2	88.4	108	132	156	179	202	247	290	334	328	0	
17	7.78	14.5	20.9	27.1	33.1	39.0	50.6	61.8	72.9	94.4	115	141	166	191	215	263	310	356	359	0	
18	8.28	15.4	22.3	28.8	35.2	41.5	53.8	65.8	77.5	100	123	150	177	203	229	280	330	379	377	0	
19	8.78	16.4	23.6	30.6	37.4	44.0	57.0	69.7	82.2	106	130	159	187	215	243	297	350	402	393	0	
20	9.28	17.3	24.9	32.3	39.5	46.5	60.3	73.7	86.8	112	138	168	198	228	257	314	370	423	407	0	
21	9.78	18.2	26.3	34.1	41.6	49.0	63.5	77.7	91.5	119	145	177	209	240	270	331	390	439	421	0	
22	10.3	19.2	27.6	35.8	43.8	51.6	66.8	81.7	96.2	125	152	186	220	252	284	348	410	454	435	0	
23	10.8	20.1	29.0	37.6	45.9	54.1	70.1	85.7	101	131	160	195	230	265	298	365	430	469	448	0	
24	11.3	21.1	30.4	39.3	48.1	56.7	73.4	89.7	106	137	167	205	241	277	312	382	450	483	0		
25	11.8	22.0	31.7	41.1	50.3	59.2	76.7	93.8	110	143	175	214	252	290	327	399	470	496	0		
26	12.3	23.0	33.1	42.9	52.4	61.8	80.0	97.8	115	149	183	223	263	302	341	416	491	509	0		
Type A			Type B									Type C									

Type A : Manual or drip lubrication. Type B : Bath or disc lubrication. Type C : Oil stream lubrication.

NOTES

1 *See* A-2 for a detailed description of lubrication types.

2 The limiting RPM for each lubrication type is read from the column to the left of the boundary line shown.

3 For optimum results, it is recommended that the roller chain manufacturer be given the opportunity to evaluate the conditions of operation of chains in the shaded (galling range) speed area.

4 The horsepower ratings of multiple strand chains are greater than those of single strand chain (*see* Table 4 for 'Multiple Strand Factors').

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. LM 10 (0224).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Regional Offices	Address	Telephone
Central	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	323 76 17 323 38 41
Eastern	1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi CALCUTTA 700 054	337 84 99, 337 85 61 337 86 26, 337 91 20
Northern	SCO 335-336, Sector 34-A, CHANDIGARH 160 022	60 38 43 60 20 25
Southern	C. I. T. Campus, IV Cross Road, CHENNAI 600 113	235 02 16, 235 04 42 235 15 19, 235 23 15
Western	Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	832 92 95, 832 78 58 832 78 91, 832 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM.

Printed at Printograph, New Delh, Ph.: 5726847